

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the present application:

LISTING OF CLAIMS:

Claims 1 to 20 (Canceled).

21. (Previously Presented) An interface device for interfacing at least one portion of at least one string of batteries with a battery monitoring system, comprising:

at least one probe configured to respectively probe the at least one portion, each probe including:

a controllable sensor configured to sense a plurality of parameters of the at least one portion;

a communication device configured to communicate data to and from the controllable sensor, the data including a control signal sent from the battery monitoring system to the controllable sensor and information signals relating to the parameters of the at least one portion; and

a memory configured to store an address assigned to each probe upon reception of an initialization signal sent by the battery monitoring system via the communication device; and

a bus configured to serially interconnect the communication device of each probe to the battery monitoring system in a daisy chain manner, the bus including an address line, a broadcast in channel line, a broadcast out channel line and voltage supply lines.

22. (Previously Presented) The device according to claim 21, wherein the communication device includes a multiplexer, an analog to digital converter, a controller configured to control operation of each probe and optical insulation configured to insulate the communication device from the bus.

23. (Previously Presented) The device according to claim 22, wherein the controllable sensor of each probe includes an alternating current conditioner and an analog front end connected to the at least one portion and to the multiplexer.

24. (Previously Presented) The device according to claim 21, wherein at least one of the at least one probe includes a battery performance probe, the at least one portion includes a positive terminal and a negative terminal of a battery, the at least one probe connected to the positive terminal and the negative terminal of the battery.

25. (Previously Presented) The device according to claim 21, wherein at least one of the at least one probe includes a current probe, the at least one portion includes a shunt resistor, the at least one probe connected to the shunt resistor.

26. (Previously Presented) The device according to claim 21, wherein at least one of the at least one probe includes a rectifier voltage probe, the at least one portion corresponds to the at least one string as a whole including a positive terminal and a negative terminal, the at least one probe connected to the positive terminal and the negative terminal.

27. (Previously Presented) A battery monitoring system, comprising:
a plurality of batteries connected in series to form at least one string of batteries;
a plurality of probes configured to respectively probe a portion of the at least one string, each probe including:

a controllable sensor configured to sense a plurality of parameters of the portion;

a communication device configured to communicate data to and from the controllable sensor, the data including control signals and information signals relating to the parameters;

a memory configured to store an address assigned to the probe upon reception of an initialization signal; and

a bus configured to serially interconnect the communication device of each probe in a daisy chain manner, the bus including an

address line, a broadcast in channel line, a broadcast out channel line and supply voltage lines; and

a system server connected to the bus and configured to transmit the initialization signal, to receive respective addresses from each probe, to select one of the probes, to transmit control signals to a selected one of the probes and to receive information signals relating to characteristics of the portion of the at least one string, the system server including a memory configured to store the information signals, a calculation device configured to calculate a plurality of values relating to the characteristics and an alarm configured to raise an alarm if at least one of the values is outside of a predetermined range.

28. (Previously Presented) The system according to claim 27, wherein the communication device includes a multiplexer, an analog to digital converter, a microprocessor configured to control operation of the probes and optical insulation configured to insulate the communication device from the bus.

29. (Previously Presented) The system according to claim 28, wherein the controllable sensor of each probe includes an alternating current conditioner and an analog front end connected to the portion and to the multiplexer.

30. (Previously Presented) The system according to claim 27, wherein the plurality of probes include at least one battery performance probe.

31. (Previously Presented) The system according to claim 30, wherein the plurality of probes includes at least one current probe.

32. (Previously Presented) The system according to claim 30, wherein the plurality of probes includes at least one rectifier voltage probe.

33. (Currently Amended) A battery monitoring system, comprising:
a plurality of batteries connected in series to form at least one string of batteries;
a plurality of probes, each probe configured to probe a corresponding portion of the at least one string, each probe including:

a controllable sensor configured to sense a plurality of parameters of the corresponding portion; and

a communication device configured to communicate data to and from the controllable sensor, the data including control signals and information signals relating to the plurality of parameters of the corresponding portion selected by the control signals;

a bus configured to serially interconnect the communication device of each of the probes in a daisy chain manner;

at least one current injection device connected to the at least one string configured to inject a current in the at least one string upon reception of a control signal; and

a system server connected to the bus and configured to select one of the probes, to transmit control signals to the one of the probes and to receive information signals relating to characteristics of the corresponding portion, the system server including a memory configured to store the information signals, a calculation device configured to calculate a plurality of values relating to the characteristics and an alarm configured to raise an alarm if at least one of the plurality of values is outside a predetermined range, the system server operatively connected to the at least one current injection device and configured to send a control signal to the at least one current injection device to inject a current in the at least one string.

34. (Previously Presented) The system according to claim 33, wherein the current includes an alternating current.

35. (Previously Presented) The system according to claim 33, wherein the plurality of probes includes at least one battery performance probe.

36. (Previously Presented) The system according to claim 35, wherein the plurality of probes includes a current probe for each of the at least one string.

37. (Previously Presented) The system according to claim 35, wherein the plurality of probes includes a rectifier voltage probe for each of the at least one string.

38. (Currently Amended) A method of initializing a plurality of probes in a battery monitoring system ~~that includes a plurality of batteries connected in series to form at least one string of batteries, a plurality of probes configured to respectively probe one of the plurality of batteries, each probe including a controllable sensor configured to sense a plurality of parameters of the one of the plurality of batteries, and a communication device configured to communicate data to and from the controllable sensor, the data including control signals and information signals relating to the parameters of the one of the plurality of batteries selected by the control signals, a memory configured to store an address assigned to the corresponding upon reception of an initialization signal, a bus configured to serially interconnect the communication device of each of the probes in a daisy chain manner, and a system server connected to the bus and configured to transmit an initialization signal, to receive respective addresses from each of the probes, to select one of the probes, to transmit control signals to a selected one of the probes and to receive information signals relating to characteristics of the one of the plurality of batteries, the system server including a memory device configured to store the information signals, a calculation device configured to calculate a plurality of values relating to the characteristics and an alarm configured to raise an alarm if at least one of the values is outside a predetermined range, said method comprising the steps of:~~

a) sending an initialize request on the a bus of a battery monitoring system, having a plurality of batteries connected in series to form at least one string of batteries, to the probes of the battery monitoring system to erase an address previously set and to set the probes to a listen mode, the probes configured to respectively probe one of the batteries, each probe having a controllable sensor configured to sense a plurality of parameters of the battery, the bus serially interconnecting a communication device of each probe in a daisy chain manner, the communication device communicating data to and from the controllable sensor;

b) selecting a probe by setting a low voltage on a probe select line;

c) sending from the probe selected in the step b) to the a system server connected to the bus an active state confirmation;

d) sending an address to the probe selected in the step b);

e) registering the address in the probe selected in the step b) and acknowledging registration;

f) upon receipt of acknowledgment, sending a signal to the probe selected in the step b) to select a next probe; and
g) for each probe, performing each of the steps b) to f).

39. (Currently Amended) A method for measuring impedance of a plurality of batteries connected in series to form at least one string of batteries, each battery provided with a probe configured to measure voltage across each of the batteries, comprising the steps of:

injecting an alternating current in each string of batteries;
measuring a voltage across each battery by a respective probe in the battery;
and
calculating the impedance of each battery by dividing the voltage by the current for each battery.

40. (Currently Amended) A method for measuring impedance of a plurality of batteries connected in series to form at least one string of batteries, each battery provided with a probe configured to measure voltage across each of the batteries, comprising the steps of:

injecting a current in each string of batteries;
measuring a voltage across each battery by a respective probe in the battery;
and
calculating the impedance of each battery by dividing the voltage by the current for each battery.